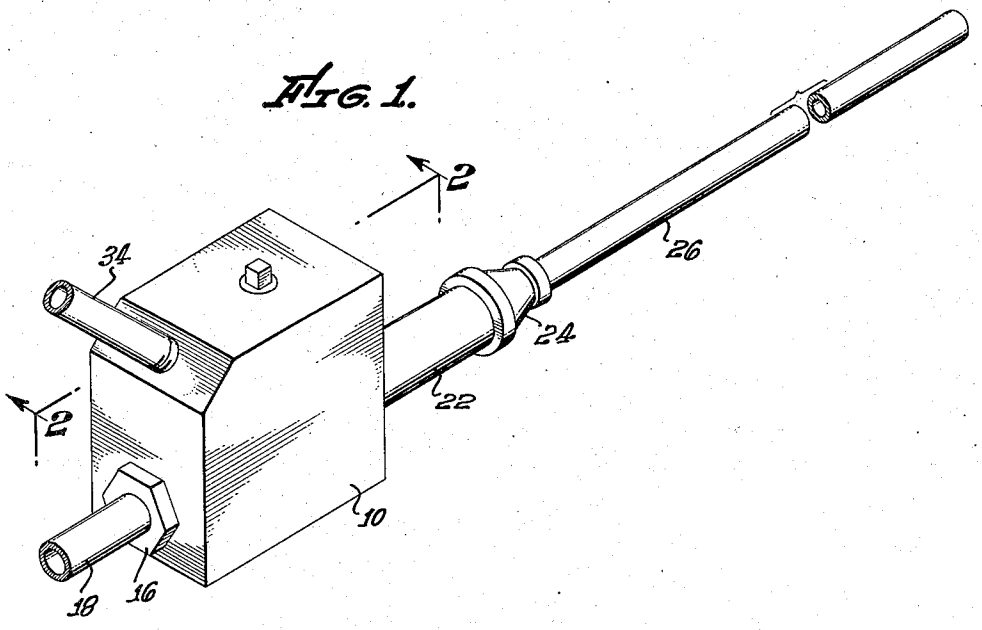
Oct. 15, 1957 W. R. LOSADA 2,809,819

FUEL ATOMIZER FOR STEEL FURNACE

Filed Feb. 28, 1955

FIG. 1.



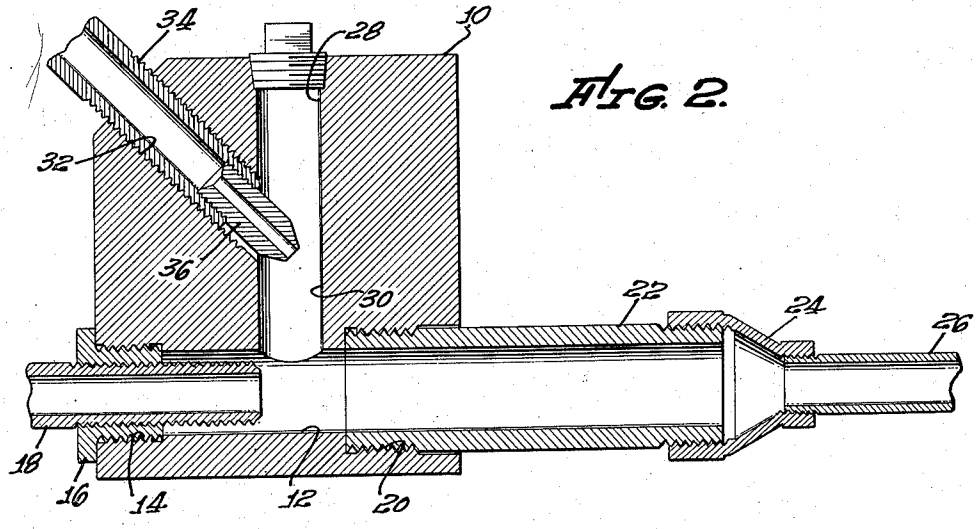


FIG. 2.

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FUEL ATOMIZER FOR STEEL FURNACE

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5 Claims. (Cl. 261—78)

The present invention relates in general to fuel atomizers and, more particularly, to a device for thoroughly atomizing and/or vaporizing oil prior to introducing same into the combustion chamber of a steel furnace, or the like, a primary object of the invention being to provide a device of this nature which atomizers and/or vaporizes the oil to such an extent as to result in a material reduction in oil consumption for the same steel production, or a material increase in steel production for the same oil consumption.

In general, oil burning equipment of the character referred to is provided with an atomizer wherein the fuel oil is mixed with a stream of heated air, or superheated steam, the oil stream or jet being dispersed mechanically throughout the steam or air stream and being vaporized by the heated stream of air or steam, which then carries the vaporized oil into the combustion chamber. In any such atomizer, the ultimate goal is complete vaporization of the oil to attain maximum combustion and, thus, minimum oil consumption. However, complete vaporization is difficult to attain, particularly with heavy fuel oils, and presently available atomizers fall far short of attaining complete vaporization. Tests of my invention have shown that it is capable of reducing fuel oil consumption by approximately twenty percent as compared to the fuel oil consumption required with presently available atomizers under the same conditions, which is an extremely important feature of the present invention since it permits a corresponding increase in production with no increase in oil consumption.

The foregoing saving in fuel oil consumption is attained with the present invention by conveying a stream of hot air or steam along a straight path, conveying a stream of oil, or other liquid fuel, along a path which converges with the air or steam path at an acute angle and which, if projected, intersects the air or steam path, and deflecting the fuel stream toward the air or steam path at a point upstream from the projected intersection of the paths, the foregoing being an important object of the invention.

Another object is to provide a fuel atomizer which includes a straight passage for hot air or steam, a straight fuel passage extending in the same general direction as the air or steam passage and making an acute angle therewith, and a baffle spaced from the downstream end of the fuel passage and extending substantially perpendicularly of the air or steam passage, but spaced therefrom, so as to deflect the fuel stream or jet transversely into the stream of air or steam without presenting any obstruction to the flow of air or steam. With this construction, efficient dispersion of the fuel throughout the stream of air or steam is attained, and the minute particles of fuel are vaporized almost completely by the hot air or superheated steam, or other heated fluid. Consequently, substantial fuel savings for the same production result, which is an extremely important feature.

Another object is to provide an axially extending nozzle

for introducing the hot air or steam into the passage therefor which is adjustable to vary the extent to which the nozzle projects into such passage, thereby shortening or lengthening the flame produced in the combustion chamber.

The foregoing objects, advantages and features of the present invention, together with various other objects, advantages and features thereof which will become apparent, may be attained with the exemplary embodiment of the invention which is illustrated in the accompanying drawing and which is described in detail hereinafter. Referring to the drawing:

Fig. 1 is an isometric view of a fuel atomizing device which embodies the present invention; and

Fig. 2 is an enlarged, longitudinal sectional view taken along the arrowed line 2—2 of Fig. 1 of the drawing.

In the drawing, the numeral **10** designates the housing of the fuel atomizing device of the invention. The housing **10** is provided with a transverse bore or passage **12** therethrough for hot air, superheated steam, or other heated fluid suitable for the purpose. At its upstream end, the passage **12** is provided with a counterbore **14** into which is threaded a bushing **16**. Threaded through the bushing **16** and projecting axially into the upstream end of the passage **12** is an induction nozzle **18** for introducing hot air or superheated steam into the straight passage **12**. By screwing the induction nozzle **18** into or out of the bushing **16** to vary the extent to which it projects into the passage **12**, the length of the flame produced by the device within the combustion chamber, not shown, may be varied. By backing the induction nozzle **18** out of the passage **12**, the flame will be shortened, and vice versa.

The passage **12** is provided at its downstream end with a counterbore **20** into which is threaded a pipe **22** of substantial length, the pipe **22** forming part of the housing **10** and the internal diameter of the pipe **22** being equal to the diameter of the passage **12** so as to provide a smooth continuation of the passage **12**. Thus, the passage **12**, and its continuation, are straight and of constant diameter for a substantial distance to provide for straight, uninterrupted flow of the hot air or superheated steam for a substantial distance. This permits taking full advantage of the velocity of the stream of hot air or superheated steam to thoroughly disperse fuel particles throughout the stream, something which cannot be attained to as high a degree with curved passages, or passages of changing cross section. For maximum effectiveness, the distance from the downstream end of the induction nozzle **18** to the downstream end of the pipe **22** should be about four to six times the diameter of the passage **12**.

Connected to the downstream end of the pipe **22** is a reducing nipple **24** to which is connected a pipe **26** leading into the combustion chamber, not shown, of the equipment with which the atomizer of the invention is used.

Formed in the housing **10** downstream from the induction nozzle **18** and substantially perpendicular to the passage **12** is a bore **28** which is plugged at its outer end and which provides a baffle or baffle means **30**. In other words, a portion of the wall of the bore **28** forms the baffle **30**, it being understood that this baffle can be formed in other ways. It will be noted that the baffle **30** is substantially perpendicular to the passage **12** and lies entirely outside this passage so as to present no obstruction to flow through the passage **12**.

Formed in the housing **10** at an acute angle to the passage **12** and intersecting the bore **28** is a bore **32** into which is threaded a fuel induction pipe **34**. Threaded into the inner end of the pipe **34** is a fuel induction nozzle **36** which extends into the bore **28** and which is adapted to direct a jet of fuel at the baffle **30**, the exact position of the nozzle **36** being adjustable by screwing the pipe **34**

into or out of the bore **32**. The jet of fuel directed toward the baffle **30** by the nozzle **36** extends along a path which, if extended, would intersect the axis of the passage **12** at an acute angle, the baffle **30** being located upstream from such point of intersection.

With the foregoing construction, the jet of fuel emanating from the fuel induction nozzle **36** impinges on the baffle **30**, which deflects the fuel transversely into the stream of hot air or superheated steam flowing through the passage **12** at high velocity. The result is that the fuel is finely atomized and thoroughly dispersed throughout the stream of hot air or superheated steam, the resulting particles being almost completely vaporized. Consequently, almost complete combustion of the fuel is attained in the combustion chamber, with fuel savings of the order of magnitude hereinbefore discussed. One feature is that the oil is deflected into the passage **12** by the baffle **30** substantially at the discharge end of the induction nozzle **18**, so that the hot air or superheated steam flowing through the nozzle **18** under substantial pressure expands in the passage **12** at the point of deflection of the oil into the passage **12**, which apparently aids in thoroughly atomizing the oil and thoroughly dispersing it throughout the stream of hot air or superheated steam.

Although I have disclosed an exemplary embodiment of my invention herein for purposes of illustration, it will be understood that various changes, modifications and substitutions may be incorporated in such embodiment without departing from the spirit of the invention as defined in the claims allowed to me and appearing hereinafter.

I claim as my invention:

1. An atomizer for intimately mixing air and fuel oil comprising a housing provided with a straight, open-centered air passage of circular cross section which extends through said housing and which is of substantially constant diameter, said housing being provided with a straight, open-centered fuel oil passage of circular cross section which converges with said air passage at an acute angle thereto of the order of magnitude of 45°, said housing being provided with an opening therein which connects the downstream end of said fuel oil passage to said air passage intermediate the upstream and downstream ends of said air passage, said opening having a wall substantially perpendicular to said air passage and spaced from the downstream end of said fuel oil passage for deflecting fuel oil emanating from said fuel oil passage toward said air passage, said wall being located externally of said air passage so as to present no obstruction to the flow of air through said air passage.

2. An atomizer according to claim 1 wherein the length of said air passage is from four to six times the diameter thereof.

3. An atomizer as defined in claim 1 including a nozzle extending axially into said air passage at the upstream end thereof for introducing a stream of air thereinto, and including means threadedly connecting said nozzle to said housing for adjusting the extent to which said nozzle projects into said air passage.

4. An atomizer as defined in claim 3 including another nozzle in said fuel oil passage and defining the downstream end thereof, said atomizer including means threadedly connecting said other nozzle to said housing for adjusting the spacing between the downstream end of said fuel oil passage and said wall.

5. An atomizer as defined in claim 4 wherein said opening connecting the downstream end of said fuel oil passage to said air passage is of circular cross section so that said deflecting wall is arcuate in cross section.

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